Nyctemeridæ.

37. *Nyctemera biformis* ♂.

Nichthemera (sic) *biformis*, Mabille, Bull. Soc. Zool. France, vol. iii. p. 88 (1878).

38. *Hylemera fragilis.*

Hylemera fragilis, Butler, Ann. & Mag. Nat. Hist. ser. 5, vol. iv. p. 236. n. 24 (1879).

Previously received from Antananarivo.

[To be continued.]

MISCELLANEOUS.

On the Resistance of Aphides to Severe Cold.

By M. J. Lichtenstein.

The author remarks that he has endeavoured to show that, just as a plant can reproduce itself by seeds and by buds, the vine-*Phylloxera* (*P. vastatrix*) is also able to reproduce both by fecundated eggs and by subterranean budding colonies—the duration of which latter may be as indefinite as that of the plant, given the necessary nourishment and warmth. This last condition seems indispensable for the agamic reproduction, but not for the existence of the insect.

During December last, when temperatures of −11° or −12° C. (=+12°·2 or 10°·4 F.) prevailed, the author found not only that the underground *Phylloxera* did not suffer at all, but that he could collect upon trees and plants in his garden numerous Aphides (he mentions *Aphis persicæ*, *euonymi*, *hederæ*, *brassicæ*, and *capsellæ*, and *Rhopalosiphon berberidis*), all stupefied by the great cold and often covered with snow or hoar-frost, but perfectly alive. The Aphides were all in the budding phase; but close by them, upon the same plants, there were eggs laid in the autumn by the fecundated females, which had long before disappeared.

The Aphides were carried into a room at a temperature of 8°–10° C. (=46°·4–50° F.), and the twigs to which they adhered planted in damp sand. In two or three days they all began to breed, bringing forth living young. Suspended by the cold, the faculty of gemmation was by no means extinct.

As there are perennial and annual plants, so among the Aphides there are species which die out every year, except the eggs, and others with indefinite reproduction by gemmation. All the above species are perennial; and it is curious that while warmth immediately causes the false females, or budding pseudogynes, to recommence their gemmation, the true egg does not hatch, and seems to await the shooting of the plants upon which it is fixed.

M. Lichtenstein believes that the annual species are much more numerous than those of unlimited duration. Thus the *Phylloxeræ* of the oak (*P. quercus*, *coccinea*, and *corticalis*), the Aphides of the

elms (*Tetraneura* and *Schizoneura*), and those of the poplar and pistachio (*Pemphigus* and *Aploneura*), or, at least, some of them, have a period during which the egg alone exists. From the 1st to the 6th January, however, the author found great numbers of *Vacuna dryoptrica*, male and female, in copulation under the leaves of an oak (*Quercus pubescens*).—*Comptes Rendus*, Jan. 12, 1880, p. 80.

Experimental Researches on the Phosphorescence of the Glowworm.
By M. Jousset de Bellesme.

Electricity, the nervous fluid, insolation, and the vital forces have been invoked by turns as causes of phosphorescence. Finally we have rested upon the existence of a phosphorescent matter emitted by luminous animals, which appeared more probable. I have thought it necessary to examine afresh this phenomenon in the glowworm, because the investigations made by Matteucci, the principal experimenter who has paid attention to the matter, were by no means irreproachably conducted. In fact, neither this author nor others have, in their experiments, taken into account the will of the animal, or endeavoured to eliminate that cause of uncertainty; so that when they placed a glowworm in carbonic acid, for example, they could not exactly determine whether the phosphorescence ceased because the medium did not allow of its being produced, or because the animal voluntarily refused to shine. It was necessary, in the first place, to become master of the phenomenon, and for that purpose to prevent the animal from shining at its own pleasure, and force it to become luminous at that of the experimenter. With this view, I remove the cephalic ganglia, which abolishes all spontaneous phosphorescence; then I replace the voluntary excitation by the passage of a moderate electrical current in the trunk or in the luminous organ. This excitation causes, with certainty, a brilliant phosphorescence.

Possessed of this process, I proved, as Matteucci had done, that the presence of oxygen is in fact absolutely necessary in order that the luminous apparatus should perform its function. The insect, prepared as just described, and immersed in carbonic acid or inert gases, such as nitrogen and hydrogen, and electrically excited in those gases, never becomes luminous.

We may therefore regard it as certain that the large cells with granular protoplasm forming the parenchyma of the phosphorescent apparatus produce a substance which becomes luminous by contact with the air conveyed by the numerous tracheæ with which this apparatus is furrowed.

In order to know what this matter is, it was necessary to be able to isolate it and analyze it. This has already been attempted. The resemblance of the luminosity to that of phosphorus has led several chemists to seek for that substance in the luminous apparatus; but their researches have been in vain, so that naturalists have found themselves in presence of two contradictory assertions. The present memoir shows that this contradiction is only apparent, and that it